G. Fred Lee & Associates

27298 E. El Macero Dr.
El Macero, California 95618-1005
Tel. (530) 753-9630 • Fax (530) 753-9956
e-mail gfredlee@aol.com
web site: http://members.aol.com/gfredlee/gfl.htm

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Comments on Current Deficiencies in US EPA/USDA Water Pollution Control Programs: Suggested Revisions as Part of the Clean Water Action Plan

Robert E. Perciasepe,
Assistant Administrator
Office of Water
US EPA Headquarters
401 M Street, S.W. (4101)
Washington, DC 20460

James Lyons
Undersecretary for Natural Resources
and the Environment
USDA
14th and Independence Avenue
Washington, D.C. 20091

Dear Mr. Perciasepe and Mr. Lyons:

In response to the request for public comment on the Clean Water Act Action Plan, I wish to provide the following comments on problems that I find with current US EPA and USDA programs for water pollution control from non-point source-derived constituents in urban area, highway, and agricultural and rural lands. Presented below are summary comments on issues that I find need to be addressed by the US EPA and USDA in formulating technically valid, cost-effective pollution control programs for the nation's waters. Since Dr. Jones-Lee and I have published extensively on these topics, I have provided references to our publications as a source of additional information on the topic area. While the cited publication references provided at the end of these comments focus on Dr. Jones-Lee's and my publications in the topic areas discussed, many of these papers and reports are reviews of the topic areas and contain an extensive list of publications by other authors on the topic areas. I am providing the US EPA and the USDA each with a set of the referenced papers and reports. Additional copies of these are, in general, available from our web site (http://members.aol.com/gfredlee/gfl.htm) and/or directly from us.

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Background and Experience

As background to these comments, I obtained a bachelor's degree in environmental health sciences from San Jose State College in 1955, a Master of Science in Public Health degree from the University of North Carolina focusing on water quality and solid waste management in 1957 and a PhD in Environmental Engineering from Harvard University in 1960. For 30 years, beginning at the University of Wisconsin, Madison in 1960, I held university graduate-level professorial teaching and research positions at several major US universities in Wisconsin, Texas, Colorado and New Jersey. During this 30-year period, I conducted in excess of $5,000,000 in research in various aspects of water quality evaluation and management and published over 500 papers and reports on various aspects of these areas. In 1989, I retired from university teaching and research and expanded the part-time consulting that I had been doing while a university professor into a full-time activity. At that time I moved back to California to the Sacramento area where, together with my wife, Dr. Anne Jones-Lee, we have a two-person specialized environmental consulting firm where we work with governmental agencies, industry and public groups on water quality and solid and hazardous waste management. Additional information on my academic background and professional expertise is available from our web site (http://members.aol.com/gfredlee/gfl.htm).

Throughout my university and private consulting careers, I have been active in non-point source pollution impact evaluation and management. I have also been involved in water quality criteria and standards development and implementation throughout most of my professional career, including serving as a US EPA peer reviewer for the water quality criteria development approach that is currently being used in the US. I have been one of the pioneers in incorporating aquatic chemistry and toxicology into the water quality management field. In 1996 I developed a paper, "Aquatic Chemistry/Toxicology in Watershed-Based Water Quality Management Programs," that specifically focused on the need to incorporate aquatic chemistry and toxicology into watershed-based water quality evaluation and management programs. This paper summarizes some of the key issues that must be incorporated into a properly developed watershed-based stormwater runoff water quality impact evaluation and management program. Throughout my over 37-year career, I have devoted considerable effort to trying to get regulatory agencies, the regulated community and the public to focus water quality management programs in the most technically valid, cost-effective manner on those constituents that are in toxic/available forms and that significantly impact the beneficial uses of receiving waters for stormwater runoff from an area.

I support the watershed approach for defining and managing water quality problems. My work on this topic began at the University of Wisconsin, Madison where in the early 1960s I was vice-chair of the Lake Mendota Problems Committee. This Committee pioneered in examining the impacts of various types of rural, agricultural and urban stormwater runoff on the beneficial uses of the Madison lakes. Of concern was the excessive fertilization of these lakes and the impaired contact recreation due to poor sanitary quality. During the 13 years that I taught and conducted research at Wisconsin, I had about 75 graduate students obtain their masters or PhD degrees under my supervision. The majority of these students focused their thesis or dissertation research on examining the aqueous environmental chemistry of constituents as they may impact the beneficial

uses of a waterbody including fish and aquatic life, public health, domestic water supply and contact recreation.

The Clean Water Act Action Plan specifically delineates the areas of excessive fertilization, protecting public health from hazardous chemicals in fish and includes contact recreation sanitary quality and preventing polluted runoff. These are all areas in which I have been and still am active in developing approaches for reliably defining the impacts of chemical constituents and pathogenic organisms on the beneficial uses of receiving waters for stormwater runoff from various types of land use, and I have published extensively on them. My recent publications in many of these areas are listed on Dr. Jones-Lee's and my web site (see above address). Many of our recent publications are available as downloadable files from this site. There are review papers at this web site on managing excessive fertilization, contact recreation sanitary quality, and excessive bioaccumulation of hazardous chemicals in fish that are a threat to those who use the fish as food. Also discussed in our papers on the web site is the topic of adequately regulating domestic water supply water quality to protect against the enteric diseases caused by *Cryptosporidium* and enteric viruses. I am pleased to see that the US EPA is finally beginning to again address these issues. They have been neglected since the late 1970s, when the Agency shifted it's resources to chasing rodent carcinogens in domestic water supplies, groundwaters and at Superfund sites.

Over-Regulation of Regulated Chemicals

One of the greatest problems that exists today in regulating non-point source stormwater runoff-derived constituents is the inappropriate approach that the US EPA adopted in the early 1980s for implementing US EPA water quality criteria into state standards and NPDES permit discharge limits. The US EPA's current approach of assuming that worst-case water quality impacts always occur from domestic and industrial wastewater discharges as well as from urban area, agricultural and stormwater runoff, is technically invalid and will, as pollution control programs are implemented for non-point sources, be tremendously wasteful of public and private resources. The Agency, in implementing its water quality criteria into state standards and discharge limits, has chosen to largely ignore the aqueous environmental chemistry and toxicology of constituents that control whether the constituents are in toxic/available forms. While some relief for certain heavy metals has been finally developed by the Agency in the implementation of the ambient water quality criteria through the use of dissolved metals, even dissolved metals tend to over-regulate many heavy metals in aquatic systems as a result of the "dissolved" metals being in particulate - colloidal form and/or complexed with organics. Further, there are many (virtually all) constituents of potential concern with respect to water quality impairment where there is little relationship between the total concentration of the constituent in water and/or sediments, and its impact on the beneficial uses of the waterbody in which the water/sediments are located.

A basic problem that has existed for many years in the water pollution control field is that environmental activist groups have had control through Congress of the development of the Clean Water Act and the formulation of regulatory approaches that have led to the over-regulation of chemical constituents for which water quality criteria have been developed. There is an urgent need

to revise the Clean Water Act so that both point and non-point source discharges of pollutants are regulated to protect beneficial uses of receiving waters without significant unnecessary expenditures for chemical constituent control. This revision will have to take the form of allowing (requiring) pollution control agencies to incorporate what is known today about how chemical constituents impact the beneficial uses of waterbodies where the constituent's aquatic chemistry and toxicology are appropriately incorporated into the regulatory program

Several years ago, I was invited to present a guest paper in a new journal devoted to how water quality criteria should be used. A copy of this paper, "Appropriate Use of Numeric Chemical Water Quality Criteria," is enclosed. In order for the US EPA and the USDA to develop technically valid, cost-effective pollution control programs that address real use impairments of concern to the public, it will be necessary for the US EPA to abandon its worst-case assumptions about how chemical constituents impact the beneficial uses of waterbodies. The first step in improving the technical validity of water pollution control programs is for the Agency to terminate its Independent Applicability policy which assumes that chemical-based criteria must be met even though biological effects-based assessments show that the constituents of concern are in non-toxic, non-available forms. Enclosed is a copy of a paper, "Independent Applicability of Chemical and Biological Criteria/Standards and Effluent Toxicity Testing," that Dr. Jones-Lee and I developed on why Independent Applicability should never have been adopted and why it must be terminated.

As a result of litigation initiated by environmental groups, the US EPA and various state pollution control agencies are engaged in crash programs to develop total maximum daily loads (TMDLs) for waterbodies whose use is "impaired" as a result of US EPA water quality criteria/state standards based on these criteria being exceeded in the waterbody for more than one time every three years. Those who understand aquatic chemistry and toxicology and water quality issues know that exceedance of water quality criteria/standards for many constituents can routinely occur without impairment of the waterbody's designated beneficial uses of concern to the public. It is my experience that the approaches that are being used for developing TMDLs for point and non-point sources of potential pollutants are largely technically invalid and will cause massive, unnecessary expenditures of public and private funds in the name of water pollution control beyond that necessary to protect the designated beneficial uses of a waterbody of concern to the public. This gross over-regulation that is occurring associated with TMDL development is largely driven by the US EPA's technically invalid Independent Applicability policy. A report developed by Dr. Jones-Lee and me, "Development of TMDLs from Evaluation Monitoring Program Results," discusses problems with current approaches for development of TMDLs and provides guidance on how to incorporate aquatic chemistry and toxicology information in developing technically valid, cost-effective TMDLs.

A prime example of this situation occurs for copper in San Francisco Bay. Last spring I presented a paper, "Regulating Copper in San Francisco Bay: Importance of Appropriate Use of Aquatic Chemistry and Toxicology," which summarizes the significant over-regulation of copper that is occurring as part of achieving a TMDL for copper inputs to the Bay arising from the Independent Applicability policy. While copper concentrations routinely occur in Bay waters above

the site-specific water quality criterion developed based on the US EPA's water effects ratio approach, extensive toxicity tests of these same waters using the same test organisms as were used to develop the criterion show that the waters are non-toxic to this and other organisms. As discussed in my paper, the copper TMDL should be based on controlling those inputs of copper to the Bay that lead to toxic/available forms of copper in Bay waters that impair the beneficial uses of the Bay through toxicity to aquatic life. The US EPA must, as part of development and implementation of the Clean Water Act Action Plan and revision of the Clean Water Act, shift the emphasis of its water pollution control programs from chemical concentration control to chemical impact control. The impact of chemicals, not their concentration, is the issue of concern to the public who must ultimately pay for the control programs. The chemical measurements used are not a reliable basis for regulating chemical constituents since they measure both toxic and available forms as well as non-toxic, non-available inert forms.

The Independent Applicability policy causes the US EPA to unreliably report to Congress every two years on the magnitude and causes of water quality problems in the US waters as part of the US EPA's biennial National Water Quality Inventory. A key component of this Inventory which causes many waterbodies to be listed as "use impaired" is the requirement established by the Agency that states list as "use impaired" all waterbodies in which there is more than one exceedance of a water quality standard every three years. The unreliability of this approach has been discussed in a paper, "Unreliable Reporting of Water Quality Impairment by the US EPA's National Water Quality Inventory." Every two years the US EPA and the states have been unreliably reporting to Congress on the magnitude of the water quality problems that are occurring in the US, especially due to urban area and highway stormwater runoff and rural/agricultural land stormwater runoff. The US EPA should stop its unreliable reporting to Congress and focus its National Water Quality Inventory on real water quality use impairments of concern to the public.

Water Quality Monitoring

I have repeatedly observed how so-called water quality monitoring programs for point and non-point sources, as well as ambient waters, focus on measuring chemical concentrations rather than chemical impacts. I have been concerned for many years about the inadequacies of current monitoring programs and during the past half-dozen years, as part of the development of the watershed-based water quality impact management programs in which I am involved in Orange County, California, as well as the Sacramento River system and Delta, I have worked with others in developing what we call the Evaluation Monitoring approach, which shifts monitoring resources from end-of-the-pavement/edge-of-the-pipe to a watershed-based, technical stakeholder-driven, focused effort on defining what real water quality use impairments are occurring in the receiving waters for the stormwater runoff. Where such impairments are found, then define, on a site-specific basis, the specific constituents responsible for the use impairment and their sources. The Evaluation Monitoring approach is summarized in, "Evaluation Monitoring as an Alternative to Conventional Stormwater Runoff Monitoring and BMP Development," and "Assessing Water Quality Impacts of Stormwater Runoff." An over 100-page report, "Development and Implementation of Evaluation Monitoring for Stormwater Runoff Water Quality Impact Assessment and Management," devoted

to providing guidance on the development and implementation of Evaluation Monitoring programs is available on our web site. The Evaluation Monitoring approach is underway in our Orange County, California work and is serving as a basis for the Sacramento River Watershed Program Phase 1 monitoring program. A report covering the Phase 1 activities, "Review of Existing Water Quality Characteristics of Upper Newport Bay, Orange County, CA and its Watershed," is available upon request. This report will be put on our web site in the near future.

Watershed-based, water quality evaluation and management programs must focus on water quality use impairments of concern to the public. Such programs cannot continue the approach the US EPA has been following since the early 1980s of focusing on chemical constituents irrespective of whether the chemicals are in toxic/available forms and are significantly adverse to the beneficial uses of the waters of concern to the public who must ultimately pay for all control programs. The US EPA and the USDA need to combine efforts to get Congress, as part of reauthorization of the Clean Water Act, to eliminate the gross over-regulation that is occurring of point and non-point sources of constituents that exceed US EPA water quality criteria/state standards.

Inadequate Regulation of Stormwater Runoff and Infiltration from Agricultural Activities

While the US EPA, through the Clean Water Act, tends to significantly over-regulate chemical constituents in stormwater runoff from urban areas, highways and agricultural areas as well as rural, developed and non-developed lands, agricultural interests tend to under-regulate pollutants associated with agricultural runoff. Of particular concern is the impact of aquatic plant nutrients and pesticides/herbicides on surface and groundwater quality. If watershed-based water quality management programs are to be successful, it will require that all sources of constituents are adequately regulated to protect designated beneficial uses of waterbodies, independent of the source. By focusing on proper evaluation of water quality use impairments in receiving waters on a watershed-based approach, it will be possible to direct efforts to control those constituents, independent of the source, that are causing real water quality use impairments in the receiving waters. Basically, the recommenced approach focuses on chemical impacts as opposed to chemical concentrations. It is essential that both the US EPA and USDA, as well as all interested parties, shift the emphasis away from controlling chemical concentrations, independent of the impact, to defining what real water quality use impairments are occurring in waterbodies and controlling these in a technically valid, cost-effective manner, independent of the source.

In our work in Orange County, California in which we are conducting a Demonstration Project for the Evaluation Monitoring approach, we found, through focusing on biological effects rather than chemical concentrations, that San Diego Creek, which is a major tributary to Upper Newport Bay, is toxic to certain forms of zooplankton. The pesticides responsible for half of the toxicity included diazinon, chlorpyrifos and methomyl. The diazinon and chlorpyrifos are derived from urban structural and landscape use, while methomyl is derived from agricultural sources. The other half of the toxicity in the stormwater runoff was due to chemicals which have not yet been identified. Work is underway this year to identify these chemicals.

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The key issue in developing technically valid, cost-effective water quality management programs for agricultural and urban pesticides is a reliable evaluation of their impact on the water quality-related beneficial uses of the waterbodies receiving stormwater runoff and irrigation return waters. For organophosphate pesticides which are toxic to limited types of organisms, such as zooplankton but not fish, there are significant appropriate questions to be asked about whether pulse killing of *Ceriodaphnia* is a significant impairment of the designated beneficial uses of a waterbody. The US EPA, the USDA and others need to work together to define what represents excessive toxicity based on the use of US EPA three-species tests. This will prove to be a key component of managing toxic chemicals from point and non-point sources that is not now being adequately addressed. These issues are discussed in a recently developed report, "Aquatic Life Toxicity in Stormwater Runoff to Upper Newport Bay, Orange County, California: Initial Results," as well as in "Stormwater Runoff Toxicity in Orange County, CA: A Demonstration of Evaluation Monitoring."

Eutrophication Management

The current US EPA has finally recognized that excessive fertilization of the nation's waters is one of the major causes of water quality use impairment. During the 1960s through the mid-1970s, I was involved in several eutrophication evaluation and management programs in the US and other countries. This involvement included work on numerous Wisconsin lakes, the US/Canadian Great Lakes, as well as being the US representative for the international OECD eutrophication studies that took place in the 1970s. These studies involved 22 countries investigating about 200 waterbodies located in Western Europe, North America, Japan and Australia. Dr. Rast and I developed the US EPA synthesis report for the US part of the OECD eutrophication studies, and I served as the US representative on the management team for the international OECD studies. In addition to formulating phosphorus load eutrophication response relationships for US waterbodies included in the OECD eutrophication studies program, Dr. Rast and I developed a paper, "Nutrient Loading Estimates for Lakes," which for the first time provides information on nitrogen and phosphorus export coefficients from various types of land use.

Dr. Jones-Lee and I continued post-OECD eutrophication study activities through the 1980s and 1990s and have expanded the database developed from these studies where there are now over 750 waterbodies located in various parts of the world which serve as a basis for assessing the impact of phosphorus loads to a waterbody on its eutrophication-related water quality. Dr. Jones-Lee's and my work in this area has involved both fresh and marine waters. A summary of this work has been published in "Eutrophication Modeling for Water Quality Management: An Update of the Vollenweider-OECD Model," and "Recent Advances in Assessing the Impact of Phosphorus Loads on Eutrophication-Related Water Quality." I am involved in these areas in Upper Newport Bay in Orange County, California at this time. Further, I have been involved over the years on the Lake Tahoe excessive fertilization problems where I was the first to define the role of atmospheric nitrogen as the primary source of nitrogen that is contributing to the decreased water clarity that is occurring in Lake Tahoe.

In the 1970s, the US EPA abruptly dropped its eutrophication investigation/management program in favor of focusing the resources available on rodent carcinogens that arose out of the Priority Pollutant list. The Agency is finally beginning to start to re-address these problems. Unfortunately, thus far, those responsible for formulating the Agency's program in eutrophication impact evaluation and management are largely ignoring the massive work that the US EPA and others have done throughout the 1960s and 1970s on this topic. Of particular importance for most of the country is that those formulating eutrophication mangagement programs for phosphorus-limited waterbodies are ignoring the well established fact that much of the phosphorus from non-point source runoff is in non-algal available forms, i.e. will not grow algae. On behalf of the International Joint Commission for the Great Lakes, my colleagues and I published a summary paper, "Availability of Phosphorus to Phytoplankton and Its Implication for Phosphorus Management Strategies." I have repeatedly observed where phosphorus management strategies are being developed in various parts of the US, such as the Chesapeake Bay region, which ignore what was well-established in the 1960s and 1970s that particulate phosphorus from urban and agricultural areas is largely not available to support algal growth.

It is essential that the US EPA formulate its revived eutrophication evaluation/management program based on a critical review of what has been done previously. Of particular importance are the results from the international OECD studies. These studies represented a $50 million effort of examining the relationship between phosphorus loads to waterbodies of various types and the eutrophication relation response. The international OECD studies, through the use of the Vollenweider relationships, provide a technically valid, readily implementable approach to define the critical phosphorus loads to a particular waterbody that must be achieved to manage the excessive fertility in the waterbody to the desired degree. Similar studies to those undertaken for phosphorus in the OECD studies need to be done on nitrogen-limited waterbodies. Of particular importance are some West Coast fresh waterbodies as well as many coastal marine waterbodies in which algal growth is often nitrogen-limited.

Dr. Jones-Lee and I have published a number of papers and reports on these topics that are listed on our web site. If there is interest in acquiring any of those listed, please contact me and I will provide a copy. They include information on determining the limiting nutrient in a waterbody, as well as the development of a monitoring program for implementation of the OECD eutrophication study results. We have also published on how eutrophication management programs should be formulated.

Sanitary Quality/Contact Recreation

One of the most significant causes of water quality deterioration in the US is associated with excessive concentrations of fecal indicator organisms in areas where waters are used for contact recreation. Associated with my public health background, I have been involved in a number of contact recreation studies in California, Texas, New Jersey and Wisconsin which have examined the relationship between stormwater runoff and deteriorated water quality based on excessive concentrations of total and fecal coliforms. This area has been a significantly neglected area by

federal and state pollution control agencies compared to its importance to the public. It is appropriate for the US EPA to develop a comprehensive program in this area. However, it is important that the Agency build this program on the significant amount of information that exists. This program should include focusing on not only the total and fecal coliforms, but also the enteric viruses and protozoan cysts that are human pathogens. The USDA will need to become involved in these issues to develop control programs for those sources of pathogenic organisms and pathogenic organism indicators that are threats to domestic water supplies and/or contact recreation that are derived from agricultural activities.

A special area of concern in this topic area is the use of reclaimed domestic wastewaters. Over the years, I have served on a number of advisory panels concerned with the adequacy of domestic wastewater treatment before reuse for shrubbery irrigation, groundwater recharge, etc. It has been my experience that inadequate monitoring of the residual pathogens and potentially hazardous chemicals associated with treated domestic wastewaters typically occurs. Dr. Jones-Lee and I have published several papers on this topic, including, "Appropriate Degree of Domestic Wastewater Treatment Before Groundwater Recharge and for Shrubbery Irrigation," and "Monitoring Reclaimed Domestic Wastewater Usage on Public Parkland Vegetation to Reduce Risks." Further information on this topic is available from our web site, including a comprehensive review of this topic, "Public Health Significance of Waterborne Pathogens in Domestic Water Supplies and Reclaimed Water," that was prepared for the California Comparative Risk Project that was conducted by Cal EPA. It was concluded, based on our report, that enteric pathogens represent a far more significant threat to public health than all the so-called hazardous chemicals represented by the rodent carcinogens on the Priority Pollutant list combined.

Contaminated Sediment Issues

The US EPA is embarking on a national Superfund for sediments-"Aquafund" through the development of chemically-based sediment "quality" guidelines. These guideline values will be used by the states to designate contaminated sediments that need remediation in a Superfund-like program where Responsible Parties will be designated to pay for the remediation. Further, NPDES-permitted dischargers to a waterbody where exceedances of the chemically-based sediment guidelines occur will have their NPDES permit limitations covering the discharge of the chemicals that exceed the guideline values reduced. While the Agency asserts that no regulatory decisions will be based solely on the chemically-based sediment quality guidelines, such assertions fail to recognize how chemically-based sediment quality guidelines are used at the state and local levels in water pollution control programs. There are a number of examples where such chemically-based guidelines are used as clean-up criteria that result in multi-million dollar expenditures for sediment remediation and NPDES permit limitations without proper evaluation of whether the exceedance of the chemical sediment guideline values which are designed to estimate toxicity actually represent toxic conditions that are significantly adverse to the beneficial uses of the waterbody in which the sediments are located.

Beginning in the mid-1980s, the Agency's staff chose what is clearly a misguided approach of focusing on the control of chemical constituents in sediments based on chemical concentrations rather than chemical impacts. The Agency ignored recommendations of a special workshop devoted to this topic which recommended that the Agency focus its sediment water quality impact evaluation and management on biological effects-based approaches, such as direct measurement of toxicity and bioaccumulation, rather than measuring chemical concentrations in sediments and trying to estimate toxicity and/or bioaccumulation. Recently the Agency has adopted co-occurrence-based sediment quality "guidelines" as a tool that is being used to identify excessive concentrations of chemical constituents in aquatic sediments. This approach is obviously technically invalid, since it has been known since the late 1960s that the total concentration of chemical constituents in aquatic sediments bears no relationship to the adverse impacts of these constituents on the beneficial uses of a waterbody. Dr. Jones-Lee and I have prepared a comprehensive discussion, "'Co-Occurrence' in Sediment Quality Assessment," that reviews the significant technical deficiencies with the Agency's proposed sediment quality guidelines. Basically, the current US EPA administration responsible for this program is opting for a quick and easy set of numeric values, ignoring the fact that the numeric values are highly unreliable in predicting toxicity. As it has been repeatedly demonstrated, even by the Agency staff, the use of Long and Morgan co-occurrence-based values is actually less reliable in predicting toxicity than flipping a coin.

Because of the importance of this topic to point as well as non-point source dischargers of stormwater runoff from urban areas, highways, agricultural lands and rural undeveloped lands, it is essential that the Agency abandon its current chemically-based approaches and redirect its efforts toward focusing on utilization of biological effects-based approaches similar to those that were developed by the Corps of Engineers and the Agency in the 1970s for regulating contaminated dredged sediments for open water disposal. Dr. Jones-Lee and I have published extensively on this topic. These publications include two invited overview papers, "Sediment Quality Criteria: Numeric Chemical- vs. Biological Effects-Based Approaches," and "Evaluation of the Water Quality Significance of the Chemical Constituents in Aquatic Sediments: Coupling Sediment Quality Evaluation Results to Significant Water Quality Impacts." Additional papers and reports on the topic are available from our web site.

Because of the importance of properly regulating contaminated sediments as it may impact maintenance dredging of US waterways, I also wish to mention two other papers developed by Dr. Jones-Lee and me that have relevance to properly evaluating the water quality significance of chemical constituents in aquatic sediments. These papers, "Water Quality Aspects of Dredging and Dredged Sediment Disposal," and "Contaminated Dredged Sediment Disposal Criteria," provide a review of the large amount of work that has been done by the Corps of Engineers, US EPA and others on evaluating the water quality significance of chemical constituents in dredged sediments and their appropriate management. These papers also include a summary of the approximately $1 million in research that my colleagues and I have conducted on this topic.

Watershed-Based Approach for Water Pollution Control

I am a strong supporter of a watershed-based approach for developing water pollution control programs. I have been involved in such programs since the early 1960s. Based on my experience, in order for such programs to be effective, there is need to level the playing field with respect to how various types of sources of chemical constituents that impair beneficial uses of waterbodies are regulated. While NPDES-permitted POTWs and industrial wastewater dischargers are being regulated to achieve overly-protective water quality standards in the receiving waters for the discharge, the current US EPA approach of trying to force urban stormwater dischargers and rural, ag and other stormwater dischargers to eventually achieve US EPA water quality criteria/state standards in the receiving waters for the discharge is technically invalid and will result in massive waste of public and private funds in implementing unnecessary chemical constituent control. The US EPA must abandon this over-regulation approach and focus on developing watershed-based approaches that specifically identify real water quality use impairments of concern to the public and determine the specific causes of these impairments and the sources of the constituents responsible for the impairment.

While there is no assurance that this watershed-based approach will, in fact, work because of the need to require that currently politically powerful and essentially unregulated sources of pollutants, such as from agricultural runoff, become regulated to control pollution - use impairment of the receiving waters, at least at this time this is the most technically valid, cost-effective approach that must be adopted. By focusing on real water quality use impairments and not on chemical concentrations associated with exceedances of overly-protective water quality criteria and standards, it may be possible to achieve the support of the public, Congress and the sources of constituents that cause real use impairments to develop control programs that will protect designated beneficial uses of waterbodies without significant unnecessary expenditures for chemical constituent control.

Pollutant Trades

A key component of the watershed-based approach that has been promoted by the US EPA is pollutant trading. As discussed by Dr. Jones-Lee and me in "Water Quality Issues in Pollutant Trading" and "Valid Pollutant Credit Trading," the current approach for pollutant trading in which it is assumed that chemical constituents are pollutants, irrespective of their chemical forms, is obviously technically invalid. Pollutants are, by definition, those constituents which impair the designated beneficial uses of waterbodies. Chemical constituents which are sometimes pollutants under certain conditions from certain kinds of sources should not, as is typically done, be considered pollutants under all conditions and from all sources. It is essential that in developing pollutant trades, the trades focus on toxic/available forms of constituents and not on total constituents as is now typically being done. This will require the incorporation of aquatic chemistry/toxicology and water quality into developing pollutant trades.

Summary

The current approach for developing water pollution control programs in this country significantly over-regulates most of the chemicals for which there are water quality criteria. This over-regulation occurs because of the inappropriate approaches that have been developed by the US EPA for implementing the US EPA water quality criteria into state standards and point source discharge permits. The Agency has opted for chemical concentration control, rather than chemical impact control. While the US EPA's current approach is bureaucratically simple to administer, it is obviously technically invalid and fails to incorporate into the water quality management programs the vast amount of science and engineering that has been developed over the past 30 years on how chemical constituents impact the beneficial uses of a waterbody.

The current US EPA water quality pollution control approach significantly under-regulates, or does not regulate at all, a wide variety of chemicals (pesticides and nutrients) that are causing significant water quality use impairments in the nation's waters that are derived from non-point as well as point sources. For the Clean Water Act Action Plan to be successful, the US EPA and the USDA must overcome the significant political problems associated with regulating agricultural sources of pollutants. The focus of this program must not be on the total chemical constituent concentration in ag runoff, but on those components of the runoff that do, in fact, significantly adversely impact the designated beneficial uses of the receiving waters for the runoff.

It is important, however, that the development of programs for control of excessive fertilization be based on those sources of constituents that contribute available forms of nutrients. Site-specific investigations of each waterbody and the sources of available forms of nutrients must be conducted in order to develop technically valid, cost-effective control programs for excessive fertilization of waterbodies.

The sanitary quality of the nation's domestic water supply sources, as well as its contact recreational resources, is a significant cause of use impairment in the US. There is need to better understand the sources and water quality significance of the total and fecal coliforms as well as enteric viruses and protozoan cysts, such as *Cryptosporidium*, derived from non-point source runoff.

The US EPA is making a significant error in its continued attempts to try to develop chemically-based sediment quality guidelines for managing contaminated sediments. The Agency should immediately abandon its chemical concentration-based approaches and re-direct its efforts to focusing on regulating sediments based on chemical impacts on the beneficial uses of waterbodies. Failure to do so will cause the US to become involved in yet another Superfund - Aquafund where massive amounts of public and private funds will be wasted as the result of using technically invalid approaches for assessing the water quality significance of chemical constituents in aquatic sediments.

Comprehensive, effects-based water quality monitoring programs are needed, first to define the water quality problems that occur in a particular waterbody and then to determine sources of the constituents responsible for the use impairment. An Evaluation Monitoring program of the type

developed by the author and his associates is a technically valid, cost-effective approach that can and should be implemented in a watershed-based approach that can define the water quality use impairments that occur in a waterbody, the causes of these impairments and the sources of the constituents responsible for the use impairments. This type of information should be used in a watershed-based framework to formulate technically valid, cost-effective water quality management programs.

While I cannot attend the public forum on November 25, 1997 because of a previous commitment where I will be making a presentation to the State of California Urban Pesticide Committee in Oakland at that same time, I would be happy to answer any questions that either of you or your associates may have on these comments or the attached materials, as well as the supplemental materials that are available from our web site. If there is any way I can be of assistance to the US EPA, the USDA and others in formulating water pollution control programs that first define real water quality use impairments that are occurring in a waterbody and then develop technically valid, cost-effective control programs for these impairments, please contact me.

Sincerely yours,

G. Fred Lee, PhD, PE, DEE

GFL:oh
Enclosures

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Copies of the above listed papers and reports are available from Drs. G. Fred Lee's and Anne Jones-Lee's web site (http://members.aol.com/gfredlee/gfl.htm) or directly from them. Additional information on these topic areas is available from them upon request.